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AQUATIC MACROINVERTEBRATE SURVEY
BIG DRY AND LITTLE DRY CREEKS,
GARFIELD COUNTY, MONTANA

1996

Prepared for the

Montana Department of Environmental Quality
Planning, Prevention and Assistance Division
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INTRODUCTION

Benthic macroinvertebrate populations are known to be key indicators of stream ecosystem health (Hynes 1960). Life spans for some of these creatures are as long as three years, and their complex life cycles and limited mobility mean that there is ample time for the community to respond to cumulative effects of environmental perturbations. The analysis of macroinvertebrate communities can thus be related to a stream's biological health, or integrity, defined by Karr and Dudley (1981) as "the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity and functional organization comparable to that of natural habitat of the region."

The multimetric approach to bioassessment using benthic macroinvertebrates uses attributes of the assemblage in an integrated way to reflect overall biotic condition. Community attributes which can contribute meaningfully to bioassessment include assemblage structure, sensitivity of community members to stress or pollution, and functional traits. Each metric component contributes an independent measure of the biotic integrity of a stream site; combining components into an overall score reduces variance and increases precision of the assessment (Fore et al. 1995).

METHODS

Aquatic macroinvertebrates were sampled by personnel of the Montana Department of Environmental Quality (DEQ) from Big Dry and Little Dry Creeks, in Garfield County, Montana on July 23 and 24, 1996. The travelling kick-net method described by Bukantis (1997) was utilized. Single samples from five riffled reaches were collected; the resulting samples are described and dated as follows:

1. Big Dry Creek at the Monte Billing Ranch, 7/23/96 nr mouth 7.44
2. Big Dry Creek above the confluence with Little Dry Creek, 7/23/96 site 2271
3. Little Dry Creek 0.25 miles below Cohagen, 7/23/96
4. Little Dry Creek below Hwy. 200 bridge, 7/24/96
5. Little Dry Creek above Rock Springs Road bridge, 7/24/96.

Habitat parameters were scored at a single site, Big Dry Creek above the confluence, using a DEQ-modified version of the habitat assessment in the US EPA's Rapid Bioassessment Protocols (RBP) (Plafkin et al. 1989).

Macroinvertebrate Sample Processing and Identification

Laboratory and data analyses were contracted to BlueStem Incorporated. The benthic macroinvertebrate samples were processed by BlueStem Incorporated personnel, using the U.S. Environmental Protection Agency's techniques for RBP III (Plafkin et al. 1989). Taxonomic identification of benthic macroinvertebrates was subcontracted by BlueStem Incorporated to Ecoanalysts Incorporated and Michael J. Mcbride.

Sample processing consisted of obtaining approximately a 300-organism subsample and was consistent with RBP III (Plafkin et al.1989). Organisms were enumerated and identified whenever possible to the taxonomic level specified in the Montana DEQ SOP (Bukantis, 1996).

The SOP requirements for subsampling and taxonomic resolution were strictly adhered to, deviating only when the quality of the specimen was lacking due to missing body parts needed for identification. When organisms were too immature to confidently take to the taxonomic level outlined in the SOP, they were more conservatively identified.

Following is a description of the subsampling procedure: Each sample was rinsed in a 0.5 mm sieve to remove preservative. The washed sample was then transferred to an appropriate size invertebrate sorting tray marked into square quadrants. Water was added to the tray to allow complete dispersion of the sample and even distribution of the organisms. Quadrants were randomly selected and organisms removed from each quadrant until the total number of organisms fell within the range of 270 to 330 (±10% of 300 organisms), or until there were no more invertebrates to remove, whichever occurred first. Any organism lying over a line separated by two quadrants was considered to be in the quadrant containing its head.

Data Analysis

Community structure, function and sensitivity to impact were characterized for each subsample using a battery of metrics developed by Montana DEQ for streams in the Plains Ecoregions of the state (Bukantis 1997). Two approaches were employed in the analysis of data for this report. The first approach to analysis relied on an ecoregional reference and scoring criteria; metric values were compared to the established Plains Ecoregions reference values (Table 1). Values and scoring criteria were derived from data from the Plains ecoregions and revised by McGuire in his review of 1995. All metrics used by McGuire except for one were used in this analysis. No information was contributed by the Percent Scrapers + Shredders metric so it was eliminated from the battery. The ecoregional reference approach allows comparison of sites sampled in Big Dry and Little Dry Creeks to plains sites elsewhere in the state.

In the second analysis, an internal reference (Table 2) was established for Big Dry and Little Dry Creeks; a reference value for each metric was established for all sites based on the performance of that metric at all sites studied. The best value, if appropriate for the analysis, was chosen as the point of comparison for each metric used. Tentative scoring criteria for the internal reference were devised from an analysis of the ranges of metric values over a data set gleaned from other sources. Data from the 1993 and 1994 surveys of Plains Ecoregions reference streams (McGuire 1994, 1995) provided eleven cases, while data from a 1996 survey conducted by Montana DEQ, as yet unpublished, provided six more cases. The total of seventeen cases is not a large database from which to establish scoring criteria for streams throughout the Plains Ecoregions, however, a wide range of biotic health was manifest in the seventeen sites, and it was considered a useful starting point for the establishment of tentative scoring criteria for internal references for bioassessments of plains streams. Enlargement of the Plains Ecoregions database, a process already underway, will add reliability to this effort.

In this study, the ecoregional reference approach proved to be the better discriminator of biotic integrity due to impairment of Big Dry and Little Dry Creeks, which weakened the evaluation based on the internal reference approach.

For both analyses, actual metric values were compared to the reference values to obtain metric scores (Table 4 for the ecoregional reference approach and Table 5 for the internal reference approach). Total metric scores were obtained by summing scores for all metrics, and an impairment classification (Table 3b) and a use support category (Table 3a) for each site was derived from this total score.

RESULTS AND DISCUSSION

Habitat assessment

Nine habitat parameters were scored at a single site, Big Dry Creek above the confluence. Habitat condition was sub-optimal there, owing to marginal benthic substrate composition, low flow and abbreviated riparian width. Bank stability, bank vegetative cover, sediment deposition and embeddedness were perceived to be sub-optimal as well. The site received an overall score of 63%.

Macroinvertebrate communities

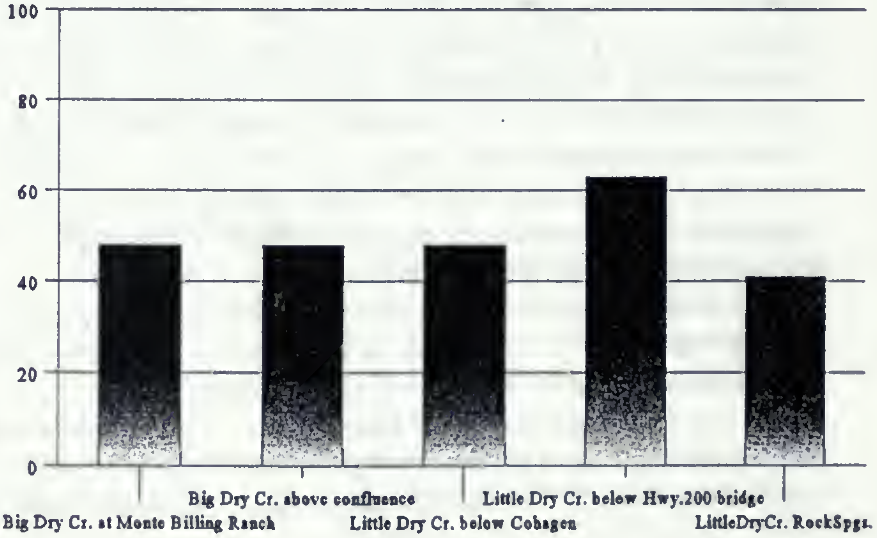
Macroinvertebrate taxa lists, metric results and other information for each sample are given in the Appendix.

Plains Ecoregions reference

Impairment classifications ranged from slight impairment at Big Dry Creek above the confluence and at Little Dry Creek below the Highway 200 bridge, to moderate impairment at Big Dry Creek at the Monte Billing Ranch and Little Dry Creek sites below Cohagen and above the Rock Springs road bridge when sites were compared to the Plains Ecoregions reference. Figure 1 displays total bioassessment scores, based on the Plains ecoregional reference, for each site.

In this analysis, the site on Little Dry Creek below the Highway 200 bridge exhibited the highest bioassessment scores; slight impairment was evident. Still, the biotic index was quite high, indicating a quite tolerant community, and sixteen taxa of collector-gatherers comprised 67% of the sampled assemblage. Both of these observations suggest organic enrichment may be limiting biotic integrity at this site. The relatively higher total bioassessment score is a result of the diversity measures; Shannon diversity, calculated at 3.24, was higher here than at any

Figure 1. Total bioassessment scores: Plains Ecoregions Big Dry and Little Dry Creeks. July, 1996.



other site, as was taxa richness (23 taxa). The percent dominant taxon metric also received the best score at this site (32%). These findings may be misleading, however, since diversity often increases when organic enrichment impacts water quality.

Slight impairment was apparently also evident at the Big Dry Creek site above the confluence; the total bioassessment score was 59% of reference when initially calculated. Two out of the three diversity measures accounted for the relatively high score, but these data must be interpreted cautiously, just as for the Little Dry Creek site below the Highway 200 bridge. In addition, it at first appears that the collector feeding group, high abundances of which typically indicate organic pollution, made up only 50% of the sampled assemblage. This is an excellent score for this metric for a stream in the Plains Ecoregions. The relative abundance of predators is very high (38%), usually also a positive indicator for biotic integrity. These observations, however, appear to be a spurious effect of faulty assignment of feeding groups to the taxa collected. The dominant taxa is reported to be Tanypodinae (comprising 36% of the sample), presumably because the creatures may have been early instars, impossible to identify to genus with certainty. It was assumed that these midges were predators, since many chironomids in this subfamily are so. However, all of the other tanypodine midges collected in the Big Dry and Little Dry Creek samples are collector-gatherers, such as *Ablabesmyia* spp.(reported at two of the five sites), *Thienemannimyia* sp., (reported at the other Big Dry Creek site, as well as at one other site), and midges from the Pentaneurini tribe (reported at three of the five sites). If the tanypodine midges collected here are similar to the ones collected at the other sites, the percent collector-gatherer metric value at this site would jump to 86%, and the number of predator taxa would fall to two. This would result in a total bioassessment score of 48% of reference and an impairment classification of moderate impairment. Organic pollution and excessive fine sediments are strongly suggested by these data. High water temperatures, probably associated with low flows, may also impact the benthic community here.

At the Monte Billing Ranch, Big Dry Creek appeared to be moderately impaired, with the assemblage dominated by the caddisfly *Cheumatopsyche* sp. A lower biotic index score at this site compared to the score at the other Big Dry Creek site suggests that organic pollution may be somewhat less of a problem here than nearer the confluence with Little Dry Creek. Taxa tolerant of fine and/or sandy sediments (e.g. *Caenis* sp., *Pseudochironomus* sp.) were abundant.

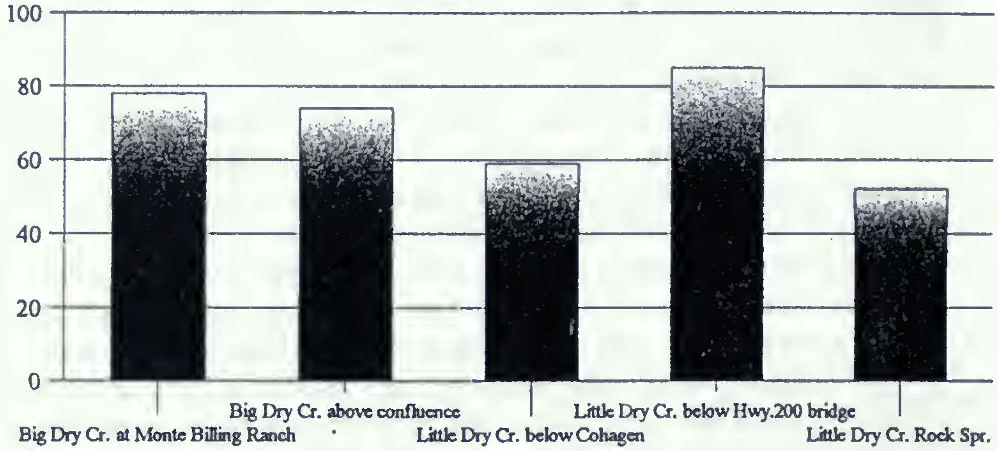
Little Dry Creek was moderately impaired at the site below Cohagen, with the sediment tolerant mayfly *Caenis* sp. making up 57% of the sampled assemblage. Organic pollution was indicated by the high biotic index score.

Above the Rock Springs road bridge, Little Dry Creek scored the lowest bioassessment of all sites studied, with organic pollution and excessive sediment again strongly suggested by the data. The highest biotic index score (7.08) indicated an extremely tolerant community, and *Caenis* sp. comprised 69% of sampled organisms.

Big Dry and Little Dry Creeks internal reference.

When an internal reference was used as the point of comparison, all sites scored considerably higher, despite the taxonomic evidence suggesting organic and sediment pollution. The internal reference approach is, in the case of Big Dry and Little Dry Creeks, useful only as a means of comparing the sampled sites to one another, and is not meant to indicate overall levels of impairment. Figure 2 displays total bioassessment scores for all sites, based on comparison to the internal reference derived from the Big Dry and Little Dry Creeks data. Differences between the sites, though small, were made more apparent when the internal reference was used.

Figure 2. Total bioassessment scores based on internal reference. Big Dry and Little Dry Creeks. July 23-24, 1996.



CONCLUSIONS

- Organic pollution and excessive sedimentation limit biotic health at all sites sampled on Big Dry and Little Dry Creeks.

- Correlations with habitat degradation could not be made for four sites, since data was not available. For Big Dry Creek above the confluence, habitat assessment reflected perceived problems of poor flow conditions, and homogeneous benthic substrate, dominated by fine sediments. Impacts from moderately high water temperatures and sediments were indicated at all sites studied.

- Functional feeding group classification of the tanypodine midges collected was probably faulty, leading to incorrectly scored metrics which were important for the data from Big Dry Creek above the confluence. When this was corrected, impairment classification for this site fell from slight impairment to moderate impairment.

TABLES

Table 1. **Metrics and scoring criteria for Plains Ecoregions streams (from McGuire 1995).**

	Scoring Criteria			
metric	3	2	1	0
Taxa richness	>24	24-18	18-12	<12
EPT richness	>8	8-6	5-3	<3
Biotic index	<5	5-6	6-7	>7
% dominant taxon	<30	30-45	45-60	>60
%Collector(g+ff)	<60	60-80	80-95	>95
% EPT	>50	50-30	30-10	<10
Shannon diversity (log2)	>3.0	3.0-2.4	2.4-1.8	<1.8
# predator taxa	>5	4-5	3-4	<3
% multivoltine	<40	40-60	60-80	>80

Table 2. **Internal reference values and tentative criteria for assigning scores to metrics based on percent comparability to reference values.**

metric	Big Dry and Little Dry Creeks reference 1996	Scoring Criteria[2] 3	2	1	0	*
Taxa richness	23	> 85%	85-75%	75-60%	< 60%	a
EPT richness	6	> 80%	80-50%	50-35%	< 35%	a
Biotic index	5.24	> 90%	90-80%	80-70%	< 70%	b
% dominant taxon	32	> 75%	75-60%	60-50%	< 50%	b
%Collector(g+ff)	82	> 90%	90-75%	75-60%	< 60%	b
% EPT	70	> 85%	85-75%	75-40%	< 40%	a
Shannon diversity (log2)	3.24	>90%	90-80%	80-70%	<70%	a
# predator taxa	4	>60%	60-50%	50-40%	<40%	a
% multivoltine	15	>35%	35-25%	25-15%	<15%	b

[1] 1996 Internal reference values are the "best" appropriate values among those calculated from 1996 Big Dry and Little Dry Creeks data.
[2] Scoring criteria are based on an analysis of metric ranges for 17 Plains Ecoregions sites in four years of data collected by the Montana Department of Environmental Quality.

* a = score is ratio of study site to reference x 100.

* b = score is ratio of reference to study site x 100.

Table 3a. Criteria for the assignment of support classifications / standards violation thresholds (from Bukantis, 1997)

% Comparability to reference	Use support
>75	Full support--standards not violated
25-75	Partial support--moderate impairment--standards violated
<25	Non-support--severe impairment--standards violated

Table 3b. Criteria for the assignment of impairment classifications (from Plafkin et al. 1989).

% Comparability to reference	Classification
> 83	nonimpaired
54-79	slightly impaired
21-50	moderately impaired
<17	severely impaired

Table 4. Metric values and bioassessments, based on Plains Ecoregions reference, for Big Dry and Little Dry Creeks, July 23-24, 1996.

metric	Big Dry Creek at Monte Billing Ranch 7/23/96	Big Dry Creek above confluence 7/23/96	Little Dry Creek below Cohagen 7/23/96	Little Dry Creek below Hwy200 bridge 7/24/96	Little Dry Creek above Rock Spr. Road 7/24/96
Taxa richness	14	17	17	23	19
EPT richness	5	3	5	6	2
Biotic index	5.24	6.47	6.46	6.04	7.08
% dominant taxon	46	36	57	32	69
% Collector (g+ff)	96	86	94	82	88
% EPT	64	32	59	30	70
Shannon diversity(log2)	2.50	3.03	2.11	3.24	2.01
#predator taxa	3	2	2	4	2
% multivoltine	41	56	29	45	15
metric score					
Taxa richness	1	1	1	2	2
EPT richness	1	1	1	2	0
Biotic index	2	1	1	1	0
% dominant taxon	1	2	1	2	0
% Collector (g+ff)	0	1	1	1	1
% EPT	3	2	3	2	3
Shannon diversity(log2)	2	3	2	3	2
#predator taxa	1	0	0	2	0
% multivoltine	2	2	3	2	3
total score (max = 27)	13	13	13	17	11
% reference	48	48	48	63	41
classification *	MOD	MOD	MOD	SLI	MOD
use support	PARTIAL USE	PARTIAL USE	PARTIAL USE	PARTIAL USE	PARTIAL USE

* classifications: (NON) non-impaired, (SLI) slightly impaired, (MOD) moderately impaired, (SEV) severely impaired.

Table 5. Percentage of internal reference values, metric scores and bioassessments for Big Dry and Little Dry Creeks, July 23-24, 1996.

metric		Big Dry Creek at Monte Billing Ranch 7/23/96	Big Dry Creek above confluence 7/23/96	Little Dry Creek below Cohagen 7/23/96	Little Dry Creek below Hwy200 bridge 7/24/96	Little Dry Creek above Rock Spr. Road 7/24/96
Taxa richness	% of internal reference	61	74	74	100	83
EPT richness		83	50	83	100	33
Biotic index		100	81	81	87	74
% dominant taxon		70	89	56	100	46
% Collector (g+ff)		85	95	87	100	93
% EPT		91	46	84	43	100
Shannon diversity(log2)		77	94	65	100	62
#predator taxa		75	75	50	100	50
% multivoltine		37	27	52	33	100
metric score						
Taxa richness		1	1	1	3	2
EPT richness		3	2	3	3	0
Biotic index		3	2	2	2	1
% dominant taxon		2	3	1	3	0
% Collector (g+ff)		2	3	2	3	3
% EPT		3	1	2	1	3
Shannon diversity(log2)		1	3	0	3	0
#predator taxa		3	3	2	3	2
% multivoltine		3	2	3	2	3
total score (max = 27)		21	20	16	23	14
% reference		78	74	59	85	52
classification *		SLI	SLI	SLI	NON	MOD

* classifications: (NON) non-impaired, (SLI) slightly impaired, (MOD) moderately impaired, (SEV) severely impaired. The classifications assigned in this table are intended only to indicate biological impairment of sites relative to one another, and are not intended to indicate actual impairment levels.

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APPENDIX

Macroinvertebrate Taxonomic Data

BIG DRY CREEK
at Monte Billing Ranch: 7/23/96

Taxon	#	%	BI[2]	FFG[1]
Tubificidae	1	0.83	10	CG
TOTAL: MISC. TAXA	1	0.83		
Fallceon quilleri	7	5.79	4	CG
Caenis	10	8.26	7	CG
Paraleptophlebia	2	1.65	1	CG
TOTAL: EPHEMEROPTERA	19	15.70		
Ambrysus	2	1.65	3	PR
TOTAL: HEMIPTERA	2	1.65		
Cheumatopsyche	56	46.28	5	CF
Oecetis	2	1.65	8	PR
TOTAL: TRICHOPTERA	58	47.93		
Simulium	1	0.83	5	CF
TOTAL: DIPTERA	1	0.83		
Cricotopus	1	0.83	7	CG
Cryptochironomus	1	0.83	8	PR
Polypedilum	3	2.48	6	CG
Pseudochironomus	26	21.49	5	CG
Thienemanniella	1	0.83	6	CG
Thienemannimyia	8	6.61	6	CG
TOTAL: CHIRONOMIDAE	40	33.06		
GRAND TOTAL	121	100.00		

1.Functional feeding group designations are given in TABLE A.
2. Biotic index scores for individual taxa, as given in Bukantis, 1997.

Aquatic Macroinvertebrate Data: BIG DRY CREEK: at Monte Billing Ranch: 7/23/96

Sample:	
% of sample used:	100
Subsample size	121
Taxa richness	14
EPT richness	5
Biotic index	5.24
% Dominant taxon	46
% EPT	64
% Collectors (g+f)	96
% Scrapers + Shredders	0
% Hydropsychinae of Trich	97
Metals tolerance index	4.32
Shannon Diversity (log2)	2.50
EPT/Chironomidae	1.92
CTQa	90.43
%Baetidae of Ephemeroptera	37
% Coleoptera	0
% Diptera	1
% Chironomidae	33
% Ephemeroptera	16
% Plecoptera	0
% Trichoptera	48
% multivoltine	41
% univoltine	59
% semivoltine	0

Functional Feeding Grp.	%RA	# taxa
Filterers	47	2
Collector-Gatherers	49	9
Shredders	0	0
Scrapers	0	0
Predators	4	3

Est. total number of organisms	121
Est. number collected per foot	3
Est. number collected per minute	121

Macroinvertebrate Taxonomic Data

BIG DRY CREEK
above confluence with Little Dry Creek: 7/23/96

Taxon	#	%	BI	FFG
Tubificidae	2	0.77	10	CG
Hyallela azteca	5	1.92	8	CG
TOTAL: MISC. TAXA	7	2.69		
Fallceon quilleri	20	7.69	4	CG
Caenis	32	12.31	7	CG
TOTAL: EPHEMEROPTERA	52	20.00		
Cheumatopsyche	31	11.92	5	CF
TOTAL: TRICHOPTERA	31	11.92		
Hydrophilidae	4	1.54	5	PR
TOTAL: COLEOPTERA	4	1.54		
Ceratopogonidae	2	0.77	6	PR
TOTAL: DIPTERA	2	0.77		
Ablabesmyia	2	0.77	8	CG
Cladotanytarsus	2	0.77	7	CG
Cricotopus	17	6.54	7	CG
Cricotopus Bicinctus Gr.	3	1.15	7	CG
Dicrotendipes	7	2.69	8	CG
Orthocladiinae	1	0.38	6	CG
Pentaneurini	31	11.92	6	UN
Psectrocladius	1	0.38	8	CG
Pseudochironomus	6	2.31	8	CG
Tanypodinae	93	35.77	7	PR[1]
Thienemanniella	1	0.38	6	CG
TOTAL: CHIRONOMIDAE	164	63.08		
GRAND TOTAL	260	100.00		

[1] See text for cautions concerning the assignment of this functional feeding group designation to these organisms.

Aquatic Macroinvertebrate Data: BIG DRY CREEK: above confluence with Little Dry Creek: 7/23/96

Sample:	
% of sample used:	67
Subsample size	260
Taxa richness	17
EPT richness	3
Biotic index	6.47
% Dominant taxon	36
% EPT	32
% Collectors (g+f)	50[1]
% Scrapers + Shredders	0
% Hydropsychinae of Trich	100
Metals tolerance index	5.01
Shannon Diversity (log2)	3.24
EPT/Chironomidae	51
CTQa	102.00
%Baetidae of Ephemeroptera	38
% Coleoptera	2
% Diptera	1
% Chironomidae	63
% Ephemeroptera	20
% Plecoptera	0
% Trichoptera	12
% multivoltine	56
% univoltine	42
% semivoltine	2

Functional Feeding Grp.	%RA	# taxa
Filterers	12	1
Collector-Gatherers	38[1]	13[1]
Shredders	0	0
Scrapers	0	0
Predators	38[1]	3[1]

Est. total number of organisms	390
Est. number collected per foot	10
Est. number collected per minute	390

[1] But see text for cautions concerning interpretation of these numbers.

Macroinvertebrate Taxonomic Data

LITTLE DRY CREEK
0.25 miles downstream of Cohagen: 7/23/96

Taxon	#	%	BI	FFG
Caenis	153	57.09	7	CG
Paraleptophlebia	2	0.75	1	CG
TOTAL: EPHEMEROPTERA	155	57.84		
Sialis	8	2.99	4	PR
TOTAL: MEGALOPTERA	8	2.99		
Hydropsychidae	1	0.37	4	CF
Cheumatopsyche	1	0.37	5	CF
Polycentropus	1	0.37	6	CF
TOTAL: TRICHOPTERA	3	1.12		
Ceratopogonidae	1	0.37	6	PR
TOTAL: DIPTERA	1	0.37		
Ablabesmyia	7	2.61	8	CG
Chironomini	1	0.37	6	CG
Cladotanytarsus	2	0.75	7	CG
Cricotopus	1	0.37	7	CG
Cryptochironomus	3	1.12	8	CG
Dicrotendipes	17	6.34	8	CG
Orthocladiinae	3	1.12	6	CG
Pentaneurini	6	2.24	6	UN
Polypedilum	3	1.12	6	CG
Pseudochironomus	58	21.64	5	CG
TOTAL: CHIRONOMIDAE	101	37.69		
GRAND TOTAL	268	100.00		

Aquatic Macroinvertebrate Data: LITTLE DRY CREEK: 0.25 miles downstream of Cohagen: 7/23/96

Sample:	
% of sample used:	50
Subsample size	268
Taxa richness	17
EPT richness	5
Biotic index	6.46
% Dominant taxon	57
% EPT	59
% Collectors (g+f)	94
% Scrapers + Shredders	0
% Hydropsychinae of Trich	67
Metals tolerance index	3.44
Shannon Diversity (log2)	2.11
EPT/Chironomidae	156
CTQa	98.25
%Baetidae of Ephemeroptera	0
% Coleoptera	0
% Diptera	<1
% Chironomidae	38
% Ephemeroptera	58
% Plecoptera	0
% Trichoptera	1
% multivoltine	29
% univoltine	71
% semivoltine	0

Functional Feeding Grp.	%RA	# taxa
Filterers	1	3
Collector-Gatherers	93	11
Shredders	0	0
Scrapers	0	0
Predators	3	2

Est. total number of organisms	536
Est. number collected per foot	13
Est. number collected per minute	536

Macroinvertebrate Taxonomic Data

LITTLE DRY CREEK
downstream from Hwy.200 bridge: 7/24/96

Taxon	#	%	BI	FFG
Nematoda	1	0.42	5	OM
Tubificidae	1	0.42	10	CG
Hyallela azteca	1	0.42	8	CG
TOTAL: MISC. TAXA	3	1.26		
Fallceon quilleri	1	0.42	4	CG
Caenis	39	16.32	7	CG
Paraleptophlebia	2	0.84	1	CG
TOTAL: EPHEMEROPTERA	42	17.57		
Ambrysus	29	12.13	3	PR
TOTAL: HEMIPTERA	29	12.13		
Sialis	1	0.42	4	PR
TOTAL: MEGALOPTERA	1	0.42		
Cheumatopsyche	27	11.30	5	CF
Hydropsyche	1	0.42	5	CF
Polycentropus	2	0.84	6	CF
TOTAL: TRICHOPTERA	30	12.55		
Dubiraphia	2	0.84	6	CG
TOTAL: COLEOPTERA	2	0.84		
Tabanidae	1	0.42	6	PR
TOTAL: DIPTERA	1	0.42		
Cricotopus	77	32.22	7	CG
Cricotopus Bicinctus Gr.	3	1.26	7	CG
Dicrotendipes	8	3.35	8	CG
Micropsectra	1	0.42	4	CG
Parakiefferiella	5	2.09	6	CG
Pentaneurini	3	1.26	6	CG
Polypedilum	2	0.84	6	CG
Pseudochironomus	12	5.02	5	CG
Rheotanytarsus	6	2.51	6	CF
Tanypodinae	12	5.02	7	PR
Thienemannimyia	2	0.84	6	CG
TOTAL: CHIRONOMIDAE	131	54.81		
GRAND TOTAL	239	100.00		

Aquatic Macroinvertebrate Data: LITTLE DRY CREEK: downstream from Hwy.200 bridge: 7/24/96

Sample:	
% of sample used:	100
Subsample size	239
Taxa richness	23
EPT richness	6
Biotic index	6.04
% Dominant taxon	32
% EPT	30
% Collectors (g+f)	82
% Scrapers + Shredders	0
% Hydropsychinae of Trich	93
Metals tolerance index	5.53
Shannon Diversity (log2)	3.24
EPT/Chironomidae	55
CTQa	97.91
%Baetidae of Ephemeroptera	2
% Coleoptera	1
% Diptera	<1
% Chironomidae	55
% Ephemeroptera	18
% Plecoptera	0
% Trichoptera	13
% multivoltine	45
% univoltine	54
% semivoltine	1

Functional Feeding Grp.	%RA	# taxa
Filterers	15	4
Collector-Gatherers	67	15
Shredders	0	0
Scrapers	0	0
Predators	18	4

Est. total number of organisms	239
Est. number collected per foot	12
Est. number collected per minute	239

Macroinvertebrate Taxonomic Data

LITTLE DRY CREEK
upstream of Rock Spring Rd. Bridge: 7/24/96

Taxon	#	%	BI	FFG
Nais variabilis	2	0.80	10	CG
Tubificidae	7	2.80	10	CG
TOTAL: MISC. TAXA	9	3.60		
Dromogomphus	2	0.80	4	PR
TOTAL: ODONATA	2	0.80		
Caenis	172	68.80	7	CG
TOTAL: EPHEMEROPTERA	172	68.80		
Corixidae	15	6.00	8	PH
TOTAL: HEMIPTERA	15	6.00		
Polycentropus	2	0.80	6	CF
TOTAL: TRICHOPTERA	2	0.80		
Tabanidae	1	0.40	6	PR
TOTAL: DIPTERA	1	0.40		
Chironomidae	1	0.40	8	CG
Ablabesmyia	8	3.20	8	CG
Cladotanytarsus	17	6.80	7	CG
Cryptotendipes	4	1.60	6	UN
Micropsectra	1	0.40	4	CG
Orthocladiinae	1	0.40	6	CG
Paratanytarsus	1	0.40	6	UN
Pentaneurini	2	0.80	6	UN
Polypedilum	2	0.80	6	CG
Procladius	2	0.80	9	CG
Pseudochironomus	4	1.60	5	CG
Tanytarsini	5	2.00	6	UN
Tanytarsus	1	0.40	6	CF
TOTAL: CHIRONOMIDAE	49	19.60		
GRAND TOTAL	250	100.00		

Aquatic Macroinvertebrate Data: LITTLE DRY CREEK upstream of Rock Springs Road Bridge: 7/24/96

Sample:	
% of sample used:	42
Subsample size	250
Taxa richness	19
EPT richness	2
Biotic index	7.08
% Dominant taxon	69
% EPT	70
% Collectors (g+f)	88
% Scrapers + Shredders	0
% Hydropsychinae of Trich	0
Metals tolerance index	3.36
Shannon Diversity (log2)	2.01
EPT/Chironomidae	3.55
CTQa	104.40
%Baetidae of Ephemeroptera	0
% Coleoptera	0
% Diptera	<1
% Chironomidae	20
% Ephemeroptera	69
% Plecoptera	0
% Trichoptera	1
% multivoltine	15
% univoltine	84
% semivoltine	1

Functional Feeding Grp.	%RA	# taxa
Filterers	1	2
Collector-Gatherers	87	11
Shredders	0	0
Scrapers	0	0
Predators	1	2

Est. total number of organisms	600
Est. number collected per foot	30
Est. number collected per minute	600

TABLE A. Functional Feeding Groups

Abbreviation	Description
CF	Collector - filterer
CG	Collector - gatherer
OM	Omnivore
PA	Parasite
PR	Predator
SC	Scraper
UN	Unknown
SH	Shredder

____Acceptable _____Needs Revision _____Reject Bukantis

Contractor Report Evaluation Form date: 17 September 1997

Contractor: BlueStem
Report Title: Big + Little Dry Creeks 1996
Report Date: Aug-5T, 1997

QUESTIONS, REVISION REQUIREMENTS FOR CONTRACTOR:

1) why was no info contributed by % Scrapers + % Shredders? pg 3: #3

2) Appeared to put extra effort + thought into data analysis, interpretation, + scoring.

3) I do not think assuming indetermined Tanypods (immatures) on #2, pg 5 is justifiable-

4) - why use terms like excessive instead of high - how she knew sediment "excessive" for setting?

Subsampling

1. Did the contractor follow the specified sub-sampling procedures?

says so in methods.

2. Are subsamples in the range of 270-330 organisms? Some, BDCMB = 100%, BDC abv LD = 260/390 No, LDC blw Co 208/536 No, LDC blw 200 Br 100%, LDC - pstr rock Cr Rd Br - 250/600 - No - Close enough so as to not likely signif effect results - But still should follow SOP's

3. Is the proportion of the sample that the contractor subsampled documented?

Yes

Taxonomy

3. Is the taxonomic resolution consistent with the SOP's?

methods acknowledges

Data Analysis

4. Is the correct set of metrics used for impairment rating?

Yes

5. Was an appropriate reference used for the analysis?

used ecoregion reference + internal reference! Good!

6. Did the contractor use replicate information in evaluating the level of resolution if appropriate?

N/A

7. For reports where time trends are being evaluated: Did the contractor account for any differences in taxonomic resolution between years, etc?

N/A

Report Details

8. Are the dates the samples were collected included in the report? yes

9. Are the report conclusions clearly summarized? yes

10. Are the pages numbered? y

11. Is the taxa list ordered consistent with the SOP's? y

12. Are any deviations from the SOP's explained and justified? mostly

Other Comments: